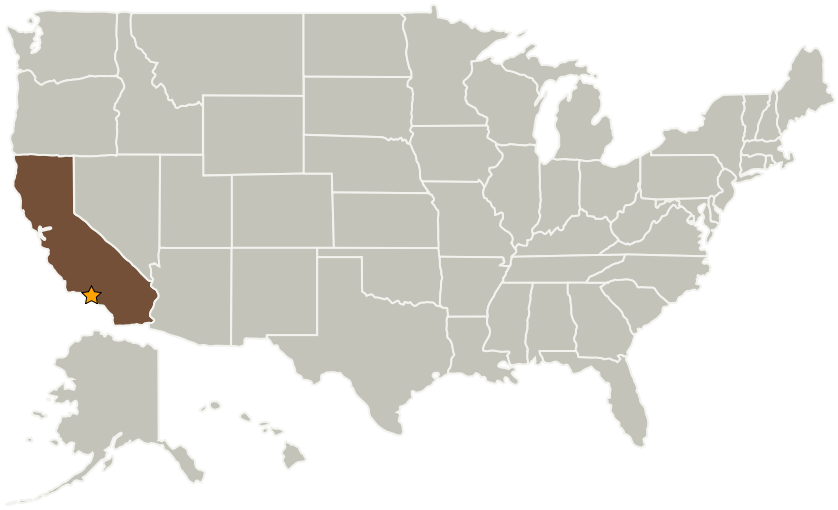
# Elemental and Chemical State Analysis, XPS, for In-Situ Materials Analysis on Mars, Phase II

Completed Technology Project (2007 - 2009)

## Project Introduction

The objective in this project is the development of a monochromatic x-ray source for a small x-ray Photoelectron Spectrometer (XPS) suitable for NASA missions. This instrument will allow in situ elemental and chemical state measurements in off-earth NASA missions. The need for these measurements is for understanding resource availability, toxicity, and chemical issues like oxidants on Mars. The small XPS developed in a previous SBIR, NNC04CA20C, has a mass of 15 Kg and will reduce to 7 kg as refined for flight. It will operate with about 10 watts. This tool needs a monochromatic x-ray source for the capability to understand the chemistries expected on NASA missions as called out in Future Space Science Enterprise (SSE) missions. In Phase I for this proposal we designed a combination of sources that will accomplish this need. It uses both a monochromatic and a non-monochromatic x-ray source to provide the quality data needed at a data rate suitable for potential missions. It uses low power, has a small mass and has some redundancy to reduce risk. Non-NASA applications will be process monitoring for semiconductor, polymer films and bioprocesses manufacturing. This application will be made available by the small size

## Primary U.S. Work Locations and Key Partners

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## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Jet Propulsion Laboratory (JPL)

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

**Small Business Innovation Research/Small Business Tech Transfer**

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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| ★Jet Propulsion Laboratory(JPL) | Lead Organization | NASA Center | Pasadena, California |
| Apparati, Inc. | Supporting Organization | Industry | Hollister, California |

| Primary U.S. Work Locations |
|---|
| California |

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

## Technology Areas

**Primary:**

- TX07 Exploration Destination Systems
  - TX07.1 In-Situ Resource Utilization
    - TX07.1.3 Resource Processing for Production of Mission Consumables